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Compliments of the writer.

OPENING OF THE MASTOID PROCESS.

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OPENING OF THE MASTOID PROCESS.

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It is not the purpose of this paper to add anything new to the indications for, or to the methods of opening the mastoid process. Nor will it contain a résumé of the enormous literature upon this subject. In a simple manner I wish to present the results of my experience and to add as much as I can to the proper reception of this operation by the profession. I shall endeavor to show that the dangers of the operation have been much exaggerated in the minds of both the profession and the layman, and that for this reason it has often been avoided entirely or postponed until it was too late to save the life of the patient.

The danger of suppurative inflammation of the middle ear and its neighboring bone cavities is recognized more and more every day. In many cases of death from suppurative meningitis or cerebral abscess or septic thrombosis of the sinuses we are no longer satisfied to regard these causes as "idiopathic," but we look for and often find suppuration and caries of the cavities forming the middle ear, as the primary lesion.

One of England's greatest surgeons, MacEwen, at a meeting of the British Medical Association a few years ago, said that "a person who had a chronic discharge from the ear, was in the position of one who had a charge of dynamite in the interior of his head which might explode at any moment." This suffices to teach us the necessity of doing all in our power to make these conditions harmless.

One of the most important means is the early opening of the mastoid process when the indications, as accepted by most aural surgeons, are present.

Concerning the mortality of the operation in itself, *i. e.* irrespective of that due to serious complications present at the time of operating, let me quote Politzer.[1] After stating numerically the result of the operation in his own experience and also in that of other great operators, he concludes that "the operation in itself, excepting in a few anatomically abnormal cases, is not dangerous, if the operator possesses that degree of practice and skill necessary for an operation near the brain and great venous sinuses." He also says that improved technique and careful antisepsis will still further decrease the mortality, and he quotes Schwartze, whose early statistics showed a mortality of 20 per cent and whose latest but 6 per cent, and Lucae, who did not lose a single case in one hundred through the operation. In his own series of 65 cases, but two were fatal; one of these had total necrosis of the petrous bone with abscess of the cerebellum, and the other had phlebitis of the sinus and erysipelas before the operation.

The indications, according to Schwartze,[2] for opening the mastoid process are:

1. Acute inflammation of the mastoid process with retention of pus in the cells if the symptoms do not permanently subside after a Wilde's incision. We are not to wait until symptoms of cerebral irritation and pyæmia appear.

2. Recurrent swelling over the mastoid, which either disappears or forms an abscess with or without fistulous opening through the skin. Symptoms of danger to life need not be present.

3. If on opening an abscess in the neighborhood a fistulous canal is formed leading to the bone.

To these Gruber adds:

4. If in the course of inflammatory processes in the ear, there is pain which does not yield to other measures, the operation is indicated even when no inflammatory signs are visible in the mastoid.

5. In otorrhœa of long standing which is not to be explained by the objective examinations of the Eustachian

[1] Lehrb. d. Ohrenheilk., p. 403.

[2] As quoted by Gruber, Lehrbuch der Ohrenheilkunde, 2nd ed., p. 515.

tube and middle ear, which resists the usual remedies, and in which there is offensive secretion containing cholesteatomatous masses or pieces of bone, the mastoid process should be opened even when there are no evident changes in it. Various operators differ as to the time to operate. Schwartze advises an early operation ; some believe in trying other measures for a long time or until serious symptoms arise, in the hope that a favorable change may make the operation unnecessary. I am convinced that general surgical principles favor early operative interference. At the same time, in view of the fact that many cases of acute mastoiditis get well rapidly under antiphlogistic treatment, this means should always be tried for a short while before operating. (Schwartze limits the time to about 8 days.)

There are various methods of operating. The trephine, which was used formerly, has been almost entirely abandoned, and the bone is opened with chisels and sometimes with bone forceps, or when soft, with the sharp spoon. In order to avoid injury to the lateral sinus or the dura mater it is advisable to enter very near to the auditory canal and not higher than the upper wall of the latter. As it is our object to reach the antrum or space joining the drum cavity with the mastoid cells,—a cavity lying above and exteriorly to the former,—the direction of the further course should be that of the auditory canal. It is not proper to enter the chisel deeper than 1.5 cm. for fear of injuring the facial nerve or the semicircular canal.

If the mastoid abscess has found a way through the bone it is proper to follow the course of the fistula.

Gruening[1] has recently recommended the removal of the entire outer wall of the mastoid process, by which means he claims to be able to locate the position of the lateral sinus and thus rid the operation of one of its chief dangers.

I should also like to mention that several surgeons have advised the removal of the posterior wall of the auditory canal and thus reach the antrum of the mastoid, but aural surgeons have accepted this method only in rare cases.

Case 1.—Mr. R., of Maryland, came to my office July

[1] New York Med. Jour., January, 1892.

23d, 1891. He had had grippe during the preceding April, which was complicated with suppurative inflammation of the right ear. At first there was much pain. The otorrhœa lasted until about two weeks before, when his neck became stiff and a swelling appeared behind the ear.

On examination, a large fluctuating swelling was found over mastoid process, pushing the auricle forward in the characteristic manner. The posterior wall of the auditory canal was pressed so far forward that examination of the deeper parts of the canal was impossible—a sign of great importance, according to Schwartze, as an indication for operating. There was no fever. The gentleman was admitted for the operation as a private patient into the City Hospital.

Operation, July 24th. After shaving the neighborhood of the mastoid and thoroughly disinfecting it, and anæsthetizing with chloroform, a long incision was made, about 1 cm. behind the line of junction of the auricle, and parallel with it, through the swollen tissues down to the bone. Thick pus of pale greenish color flowed out of the incision. After cleaning out the wound and exposing the bone by pushing the periosteum out of the way with a raspatory, an exceedingly small opening was found near the anterior edge and below the middle of the process. This was carefully enlarged by chisels until about 1 cm. in diameter, and a cavity as large as a small hazel-nut was found beneath, filled with pus and granulation tissue. The cavity was scraped perfectly clean with sharp spoons, irrigated and packed with iodoform gauze. The incision was partly closed in its upper portion and the wound dressed in iodoform and iodoform gauze. It remained perfectly aseptic and was dressed every fourth day and kept packed with iodoform gauze to prevent too early union of the surfaces.

On August the 1st, *i. e.* one week after the operation, the patient was allowed to leave the hospital and come to the office for dressing. The wound healed rapidly, and the canal into which it was converted disappeared entirely in about 7 or 8 weeks after the operation. Let me add, in closing this case, that the patient felt better soon after the

operation and had no further pain. The ear also began to improve soon and hearing was in great part regained. There was no discharge from the ear.

CASE 2.—Mr. P., of North Carolina, a student of medicine, first consulted me February 23, 1891, on account of acute suppurative otitis media of the right ear of two days' standing, following the grippe. There was considerable pain in the ear and also sensitiveness over the mastoid process, with slight swelling but no redness of its surface. The auditory canal contained a bloody discharge. The posterior segment of the drumhead was much swollen and very sensitive. I made a small incision here which gave great pain. He was then treated with the 10 per cent solution of carbolic acid in glycerine as recommended by Hewetson and Hartmann. He returned in two days with profuse yellow discharge and diminished pain. The patient was now looking very badly, but continued his studies with great energy.

He did not present himself again for four weeks. On March 24, when I saw him, there was profuse suppuration. He was then advised to use daily injections of boiled water and (after drying canal) insufflations of boracic acid. The seriousness of his trouble was explained to him and he was asked to call every other day. I saw him on March 27, when the condition was about the same, and again on April 3. Let me remark, parenthetically, that the patient was now in the midst of his final examinations, but that it became impossible for him to continue. He had had excruciating pain during the last week and sensitiveness behind the auricle; on April 1, a large swelling had made its appearance over the mastoid, the pain then diminishing somewhat. The auricle was pushed forward and outward, as in case 1, by the large fluctuating swelling. There was no fever, but the patient had become very emaciated and was in a very bad condition.

Operation, April 4, 1892, at the City Hospital. The patient was carefully prepared and anæsthetized with chloroform. A long, deep incision was made (as in case No. 1) which exposed a deep abscess and allowed the thick yellowish pus to flow out. With a probe, an opening was

found on the surface of the mastoid about 3 or 4 mm. in diameter and beneath this a large cavity. The periosteum was removed, the opening carefully enlarged so as to admit the little finger, and it was then evident that the outer layer of the mastoid was but a thin shell of bone and it was removed in great part. The opposite or inner wall of the cavity was very soft, and when examined with the blunt probe—an instrument which should be used constantly in these operations—*no bone could be felt*, so that it was very probable that *the soft granulations were upon the surface of the exposed dura mater*. Some of the superficial granulations were removed very gently. The cavity was irrigated with sublimate solution and was carefully filled with iodoform gauze. The irrigating fluid did not pass out through the ear, which was still suppurating. The wound was dressed with iodoform and iodoform gauze, after having been closed with a suture in its uppermost portion.

The patient did not stand the chloroform well, but vomited and felt very sick, even on the following day. The ear felt much better. There was no fever.

On the fourth day the ear was dressed and the wound irrigated. There was still no communication with the middle ear and no suppuration from the ear.

On April 9th (*i. e.* five days after the operation) the patient had improved so much that he was able to take special examinations in the remaining branches.

The wound rapidly grew smaller. On April 23d (19 days after the operation) he left for his home in North Carolina, where, according to a letter received shortly after, he was progressing nicely.

I wish to draw attention to the fact that though there was not sufficient communication between the middle ear and the wound to allow the irrigating fluid to pass through, still the *discharge from the middle ear ceased immediately after the operation*. This curious fact is not uncommon, and is discussed by Politzer. The seriousness of this case need not be dwelt upon when we remember that the dura mater was exposed and covered with granulations. The operation was performed three days after the swelling appeared, but I should have advised it earlier if I had seen the patient.

Case 3 was a colored girl about 20 years old. She was suffering with suppurative otitis media of long standing. For some time I advised her in vain to submit to an operation, for the pain in the ear and mastoid process was very great, though there was not much swelling; her condition appeared to me to be very serious. The pain finally became so great that she came and begged to have the operation performed. The otorrhœa had stopped for several weeks. I had seen her only at long intervals.

On November 7, 1891, I had her admitted to the City Hospital and on the same day performed the following operation. The patient was treated as were cases 1 and 2, and anæsthetized with chloroform. The incision opened a deep abscess over the mastoid. On examination, the surface of the bone seemed at first quite normal, but a careful search revealed a small opening about 2 mm. in diameter in the anterior upper part of the process. Let me say here that these fistulous openings are often very small and difficult to find, as in this and in the first case, so that failure to find one in similar cases unless the bone is thoroughly exposed to view does not prove that there are no openings and that the interior of the process is normal.

In this case the opening was enlarged, and an irregular abscess cavity in the bone as large as a small hazel-nut was exposed. This was carefully cleaned of pus and granulation tissue by the use of the sharp spoon, disinfected and packed with iodoform gauze. The long wound was closed somewhat from above by two sutures and an iodoform dressing applied. There was no pain whatever after the operation and no rise of temperature. Six days afterward I redressed the wound for the first time, but found it as clean as when first dressed. The patient being relieved of pain soon left the hospital against my wish, and when I saw her soon afterward there was a small fistulous canal remaining. This I am sure would have been prevented if the patient would have submitted to regular treatment.

The danger of long delay is well shown in the following case in which it cost the patient's life.

Case 4.—J. B., aged 60 years, was admitted, Aug. 22d, 1891, into the City Hospital. He had had an intermittent

otorrhœa from the right ear for about seven months, but this had ceased about six weeks before. At this time the pain became more intense and about three weeks later it forced him to leave his work. I did not see the patient till Aug. 22d, 1891. When examined by me the patient was suffering much pain. There was a large painful swelling behind and above the ear, which had made its appearance ten days before. Fluctuation could be felt indistinctly. The swelling was farther from the ear and higher than in the other cases and did not push the auricle out of position. The external auditory canal was clean, the deeper parts were red and swollen. The watch was heard on contact. On inquiry I learned that he had had a severe chill three days before.

Operation, Aug. 22d, 1891. Same preparations were made as in other cases. Chloroform anæsthesia. Long incision through part of greatest swelling, which allowed considerable amount of pus to escape. Found an opening about 5 mm. in diameter, filled with granulations. This was enlarged until it admitted the little finger (10–12 mm.) Cleaned out gently. The opening is situated about 3.5 cm. from auditory canal and it was no surprise to find that the inner plate of the bone had been destroyed. The cavity was then washed out thoroughly and treated like the other cases. Patient recovered nicely from the anæsthesia. During the following night there was a severe chill.

Aug. 23. Patient became very weak after the chill; temperature between 103° and 104°.

Aug. 24. Patient sank into low muttering delirium and died that afternoon. The post-mortem examination was made by Prof. N. G. Keirle, Pathologist to the City Hospital, who found: (1) Diffuse meningitis, especially over the convex surface of the cerebrum; (2) small open abscess cavity on the under surface of the temporal lobe where this touches the margin of the cerebellum and opposite to the opening in the bone; (3) firm white fibrin thrombus in the lateral sinus which is completely destroyed at the opening in the bone; (4) large opening on the inner surface of the temporal bone corresponding to the external opening enlarged by operation, together with a second abscess in

the central part of mastoid. No communication can be found between the former and the latter or the drum cavity. (Specimen demonstrated.) The middle ear and drumhead appear but little altered.

In this case the patient was brought to me after pyæmia had set in. The physician who had attended the patient had advised an operation long before, but his advice was rejected by the patient. It was only when he found that he was getting weaker and when the pain grew intolerable that he finally consented to have it done, and he was then brought to me. It was too late. Some authorities, regarding the hopelessness of this condition, look upon pyæmia as a contra-indication to the performance of the operation. I cannot accept this view, especially since Moos published a case in which there were all signs of pyæmia from thrombosis of a sinus with frequent chills which gradually recovered after an operation.

CASE 5 is one of no ordinary interest. The patient, T. C., was a boy aged 17, of very delicate build. He was sent to me by my friend Dr. Branham. Since childhood he had otorrhœa—for a long time he had had a number of fistulæ in front and behind the right ear. He had been under treatment, but was getting no better. The auditory canal was partially filled with very firm polypi, some of which were removed. Diagnosis: Necrosis of temporal bone.

Operation, Aug. 20th, 1890. Chloroform anæsthesia. Our intention was to open over the mastoid and get free drainage from this point, after separating any necrotic portions. An incision was made behind the auricle about ½ cm. from line of junction. This was followed by great hemorrhage. Necrotic bone was felt to cover a large area above and below. The wound was rapidly extended upward and forward over the auricle to meet the fistulæ in front, at the same time plugging the lower portion of the wound firmly with absorbent cotton to control the hemorrhage. The bleeding could be controlled with utmost difficulty. It was quite out of the question to attempt to use artery forceps, for the whole surface of the wound was bleeding. It could not be inspected for a moment. By the finger, the whole upper part of the temporal bone was likewise found

to be ulcerated, with rough and ragged edges. The excessive hemorrhage forced us after a time to desist from any further attempt to clean the bone; the wound was firmly tamponed with absorbent cotton which had been soaked in a sublimate solution. The patient lost a great quantity of blood and was very weak after the operation. He was put in a warm bed and rapidly recovered, though I had grave fears after the operation that he would not survive the hemorrhage.

I learnt afterwards that the patient's father was a "great bleeder" and that he also had shown evidence of hæmophilia. The ear was dressed four days after the operation and water passed freely through the wound when injected into the auditory canal. The wound was dressed daily and showed a tendency to close rapidly, but several fistulæ remained. The patient was afterwards treated with antiseptic injections to keep the wound clean. He left the city recently.

I believe that had we not had to deal with this unexpected hæmophilia the bone could have been thoroughly freed of all necrotic portions or sequesters and perfect recovery brought about.

Operations on the mastoid are not made only when it contains an abscess cavity or sequesters. Among the other conditions which such operations can relieve are those classed under "sclerosis of the mastoid process" or "condensing mastoiditis." Such a case is the following:

Case 6.—H. M., male, aged 52, was admitted into the City Hospital early in August, 1890. He complained that he had had ear trouble since childhood. During last month he had had very severe pain in right ear. There was some discharge. The drumhead was covered with pus; hearing was moderate. The pain seemed to be centered in the mastoid process and this was exceedingly tender to the touch, though there was neither redness nor swelling of this region. Our ordinary means failed to relieve the pain. After being under treatment for one week I decided to open the mastoid process.

Operation, Aug. 14th, 1890, performed in a manner similar to that described in cases above. The surface of the

mastoid appeared normal. We entered with the chisel just behind the auditory canal. We had not gone very far before it was evident that it was a case of "sclerosis" in which the spongy bone of the mastoid is replaced by solid bone as hard as ivory. We entered almost half an inch before we reached a small air cell. The opening in the bone was funnel-shaped. It was cleaned and irrigated, and then the skin wound was closed entirely and dressed with iodoform gauze.

The wound healed by first intention. As is the rule, so in this case, the pain subsided entirely immediately after the operation and did not reappear. There was likewise no further suppuration from the middle ear.

I performed the operation in three other cases; one has been published as "a case of extensive caries and cholesteatoma, etc.," (Arch.of Otology, 1891); the other two were in the nature of exploratory operations. I wish only to say here in reference to those cases, which I shall publish at some future time, that both recovered rapidly from the operation.

In conclusion, let me express the belief that the day is not far distant when the operation under consideration will be much more frequently practised. Authorities in otology are already almost unanimous in recommending its wide and frequent application. I am convinced that it will often be performed simply as an explorative measure, especially in the treatment of otorrhœa complicated with necrosis, with cholesteatoma or with severe pain.

Let me warn against the reliance upon the so-called conservative treatment with the internal exhibition or the external applications of various remedies. This is a disease which must be treated surgically. I am of the opinion, based upon the experience of the cases I have narrated, that a simple incision down to the bone—known as Wilde's incision—cannot be an efficient means of treating internal mastoid affections. I call your attention to the fact that in all of my cases in which there was an abscess over the mastoid, a primary abscess cavity was found within the mastoid, and in several the fistulous canal was so narrow that it could scarcely be found. A simple incision might

relieve this condition, but it is very likely not to. It will not relieve us of the danger of extension of the mastoid affection and it will almost inevitably leave a fistulous opening.

I hope I have made clear that mastoid affections are to be treated rationally and surgically—that we are not to lose valuable time in treating abscesses and other dangerous conditions by poultices and salves and internal medication, but that we must learn to enter safely into the process and remove the dangerous or painful source of disturbance.

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